Mellanox Adapters

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October, 2018

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Agenda

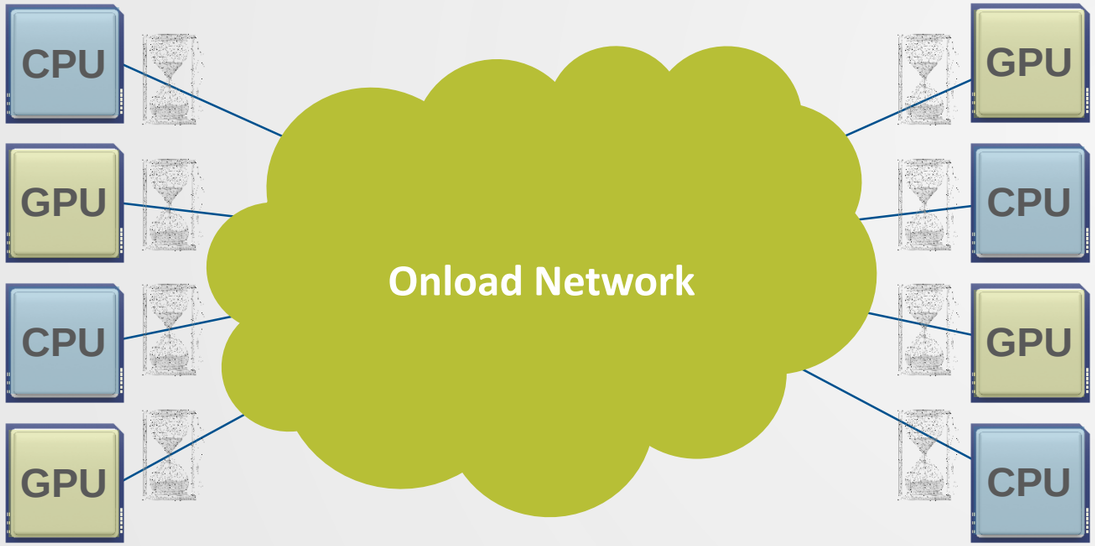
- Mellanox Introduction
- Mellanox Solution
  - Adapters Solution
  - SmartNics Solution

Mellanox introduction

The Need for Intelligent and Faster Interconnect

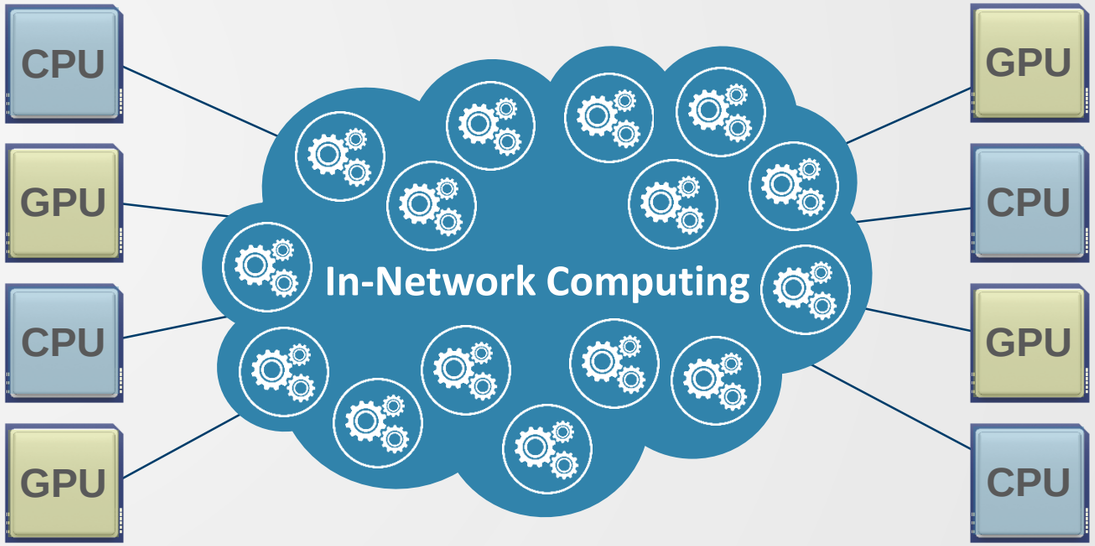
Faster Data Speeds and In-Network Computing
Enable Higher Performance and Scale

CPU-Centric (Onload)



Must Wait for the Data
Creates Performance Bottlenecks

Data-Centric (Offload)



Analyze Data as it Moves!

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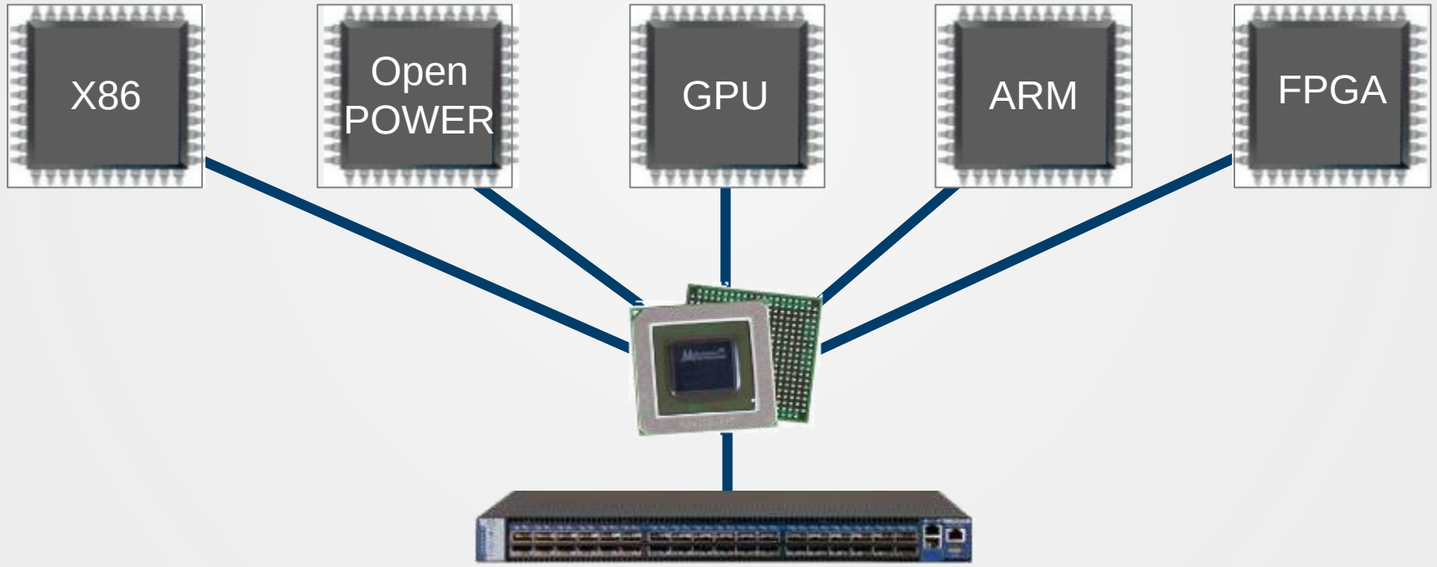
End-to-End Interconnect Solutions for All Platforms

Highest Performance and Scalability for

X86, Power, GPU, ARM and FPGA-based Compute and Storage Platforms

10, 20, 25, 40, 50, 56 and 100Gb/s Speeds



Smart Interconnect to Unleash The Power of All Compute Architectures

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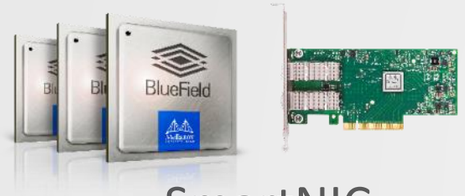
Exponential Data Growth Everywhere



SmartNIC

BlueField

System on a Chip

Innova ConnectX

Adapters

Spectrum Mellanox Quantum

Switches

LinkX

Cables & Transceivers

Higher Data Speeds

Faster Data Processing

Better Data Security

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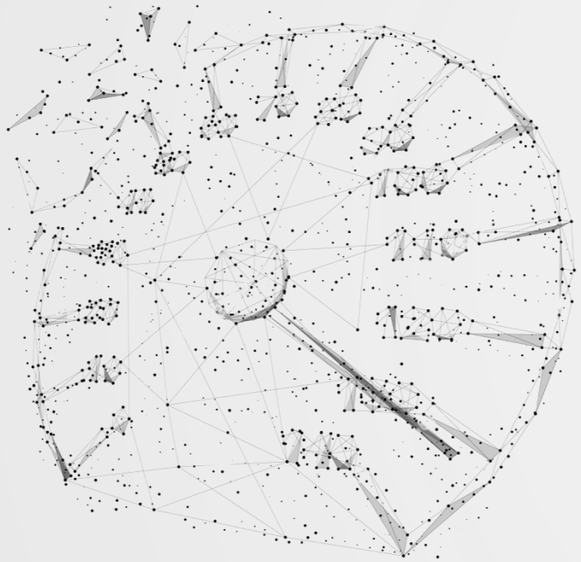
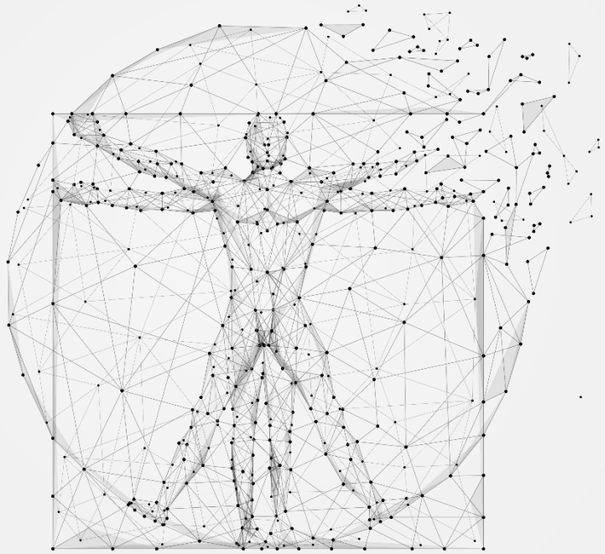
Main Technology Trends

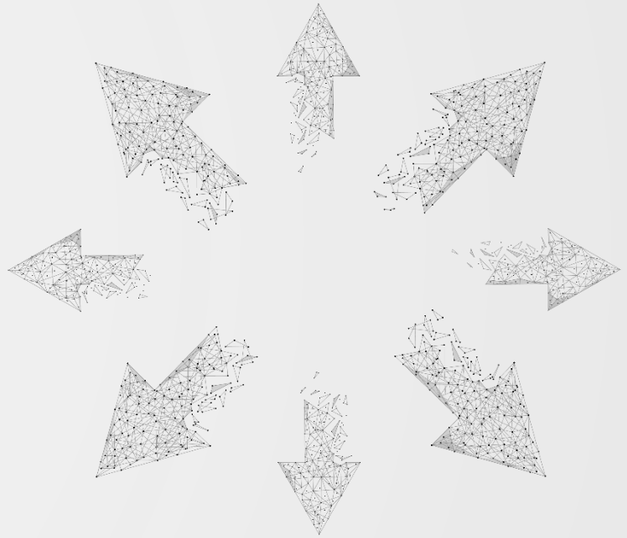
Network Performance and Flexibility



Intelligence Moving to the Network



Scale-Out Architectures



HPC | Cloud | Telco | Storage | Financial | Machine Learning

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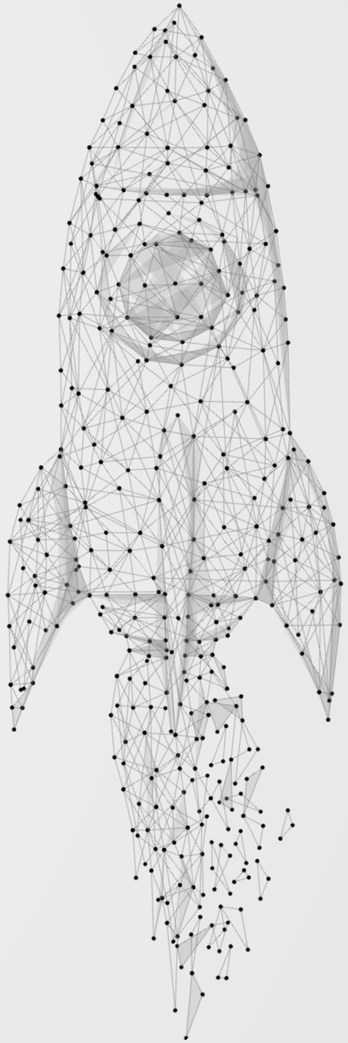
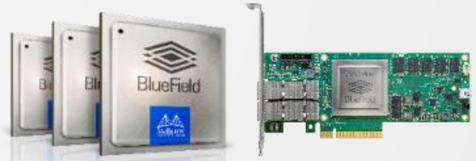
Highest-Performance 100Gb/s Interconnect Solutions

ConnectX-5 Adapters	100Gb/s Adapter, 0.6us latency 175-200 million messages per second (10 / 25 / 40 / 50 / 56 / 100Gb/s)	
SwitchIB-2 Switch	36 EDR (100Gb/s) Ports, <90ns Latency Throughput of 7.2Tb/s 7.02 Billion msg/sec (195M msg/sec/port)	
Spectrum Switch	32 100GbE Ports, 64 25/50GbE Ports (10 / 25 / 40 / 50 / 100GbE) Throughput of 3.2Tb/s	
BlueField SoC	System on Chip and SmartNIC Programmable adapter Smart Offloads	
LinkX Interconnect	Transceivers Active Optical and Copper Cables (10 / 25 / 40 / 50 / 56 / 100Gb/s)	
HPC-X Software	MPI, SHMEM/PGAS, UPC For Commercial and Open Source Applications Leverages Hardware Accelerations	



Highest-Performance 200Gb/s Interconnect Solutions

ConnectX-6 Adapters	200Gb/s Adapter, 0.6us latency 200 million messages per second (10 / 25 / 40 / 50 / 56 / 100 / 200Gb/s)	
Mellanox Quantum Switch	40 HDR (200Gb/s) InfiniBand Ports 80 HDR100 InfiniBand Ports Throughput of 16Tb/s, <90ns Latency	
Spectrum-2 Switch	16 400GbE, 32 200GbE, 128 25/50GbE Ports (10 / 25 / 40 / 50 / 100 / 200 GbE) Throughput of 6.4Tb/s	
BlueField SoC	System on Chip and SmartNIC Programmable adapter Smart Offloads	
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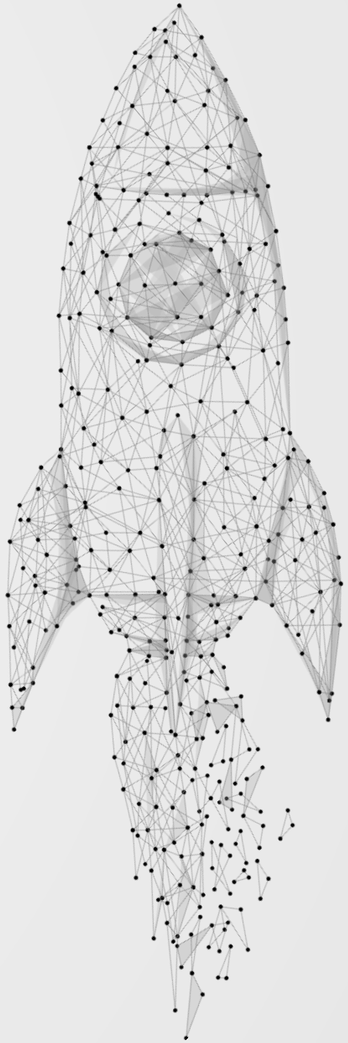

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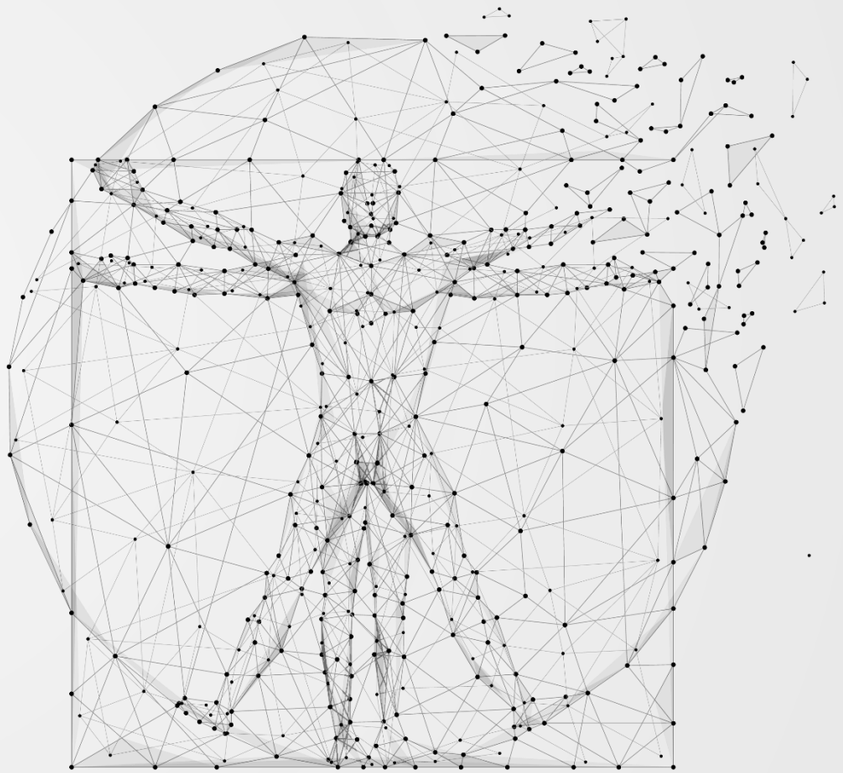
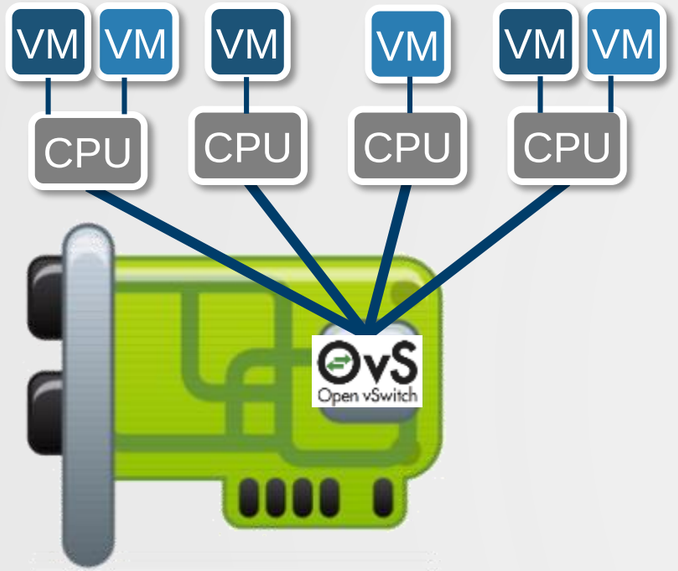
Adapters solution

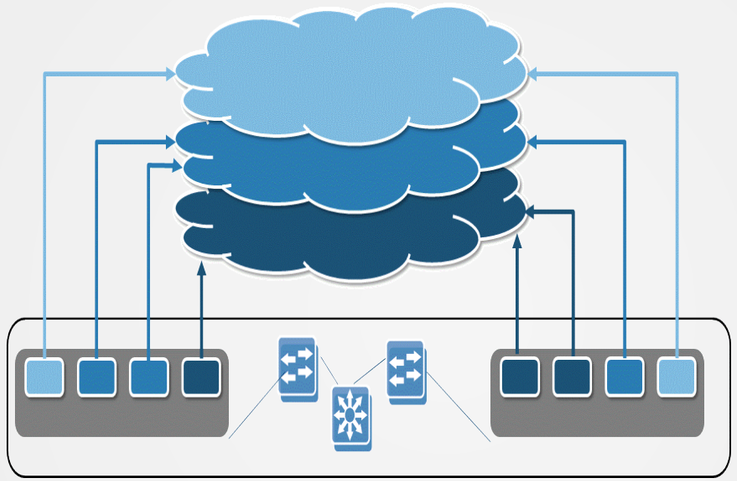


Converged Infrastructure Relies on Efficient Data Movement

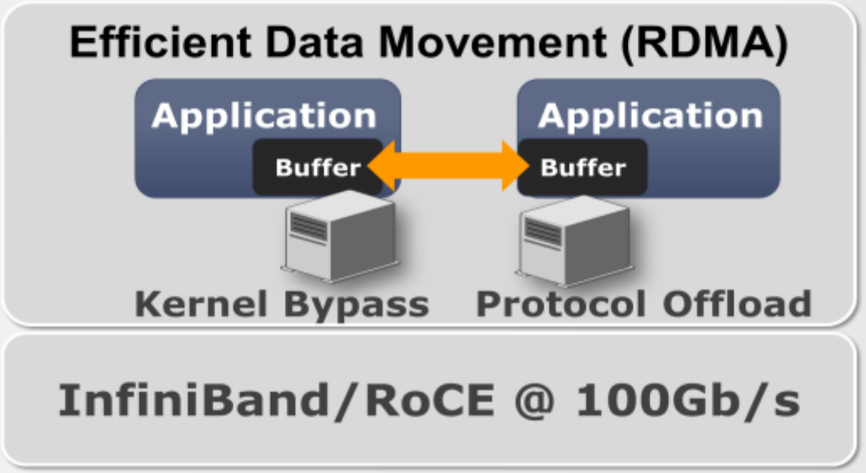


Embedded Switch
Hardware OVS Switch

NVGRE, VXLAN, GENEVE



Virtual Overlay Network
Acceleration



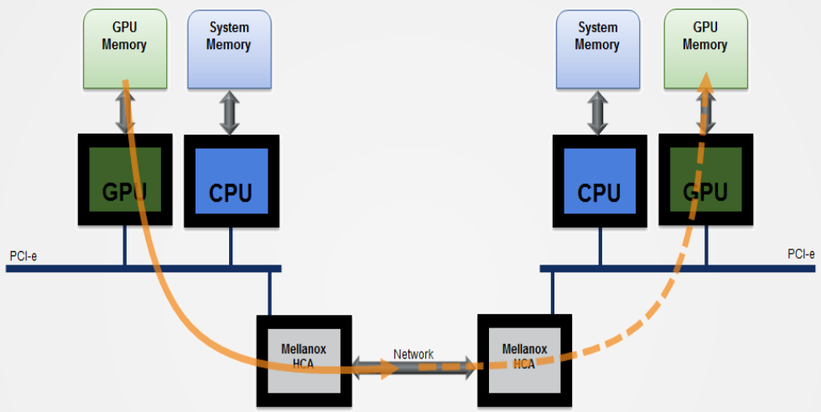
Efficient Data Movement
With RDMA

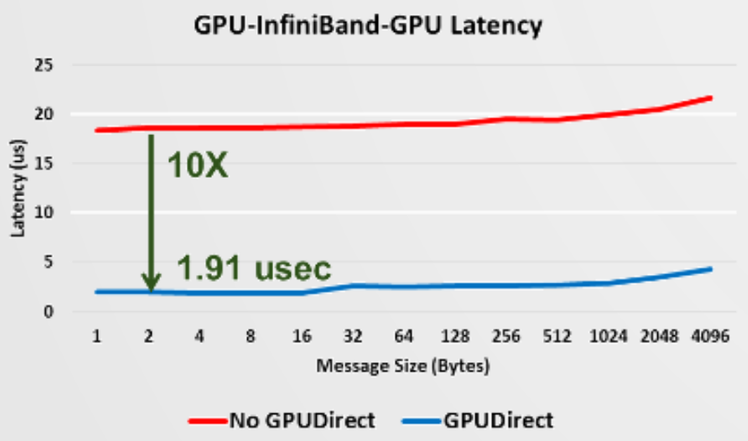
- Multi-Host & eSwitch: Embedded hardware OVS switch – Advance Flow Steering Engine
- Virtual network acceleration (VXLAN, NVGRE, GENEVE)
- RDMA – Efficient Data Exchange - Low Latency, Low CPU Overhead

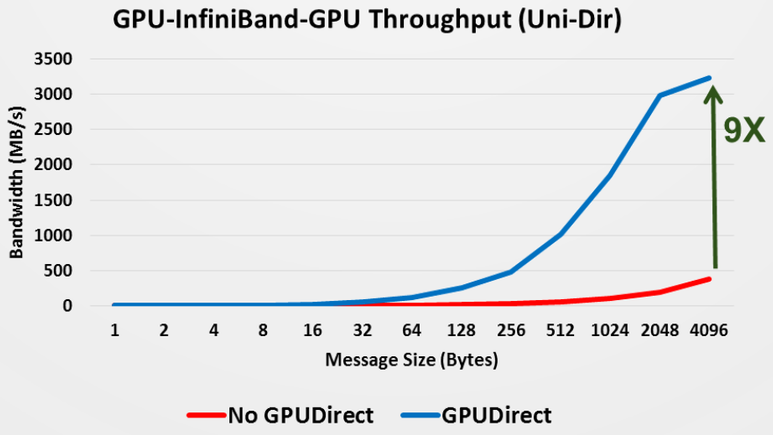
10X Better Performance with GPUDirect™ RDMA

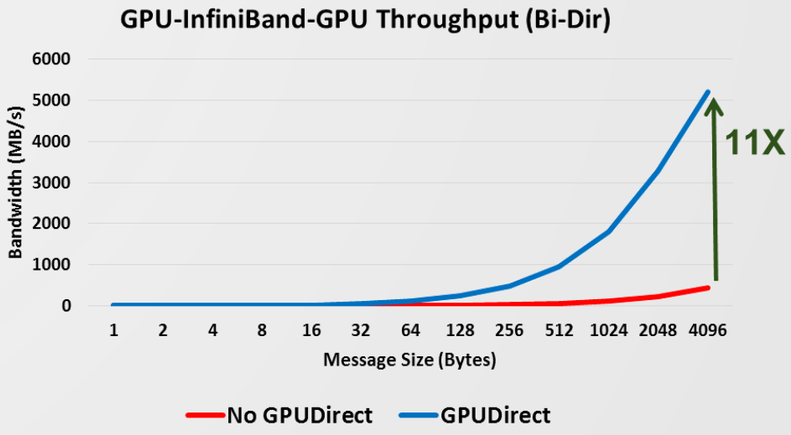
- Purpose-built for Acceleration of Deep Learning
- Lowest communication latency for acceleration devices
- No unnecessary system memory copies and CPU overhead
- Enables GPUDirect™ RDMA and ASYNC, ROCm and others
- InfiniBand and RoCE

GPUDirect™ RDMA, GPUDirect™ ASYNC

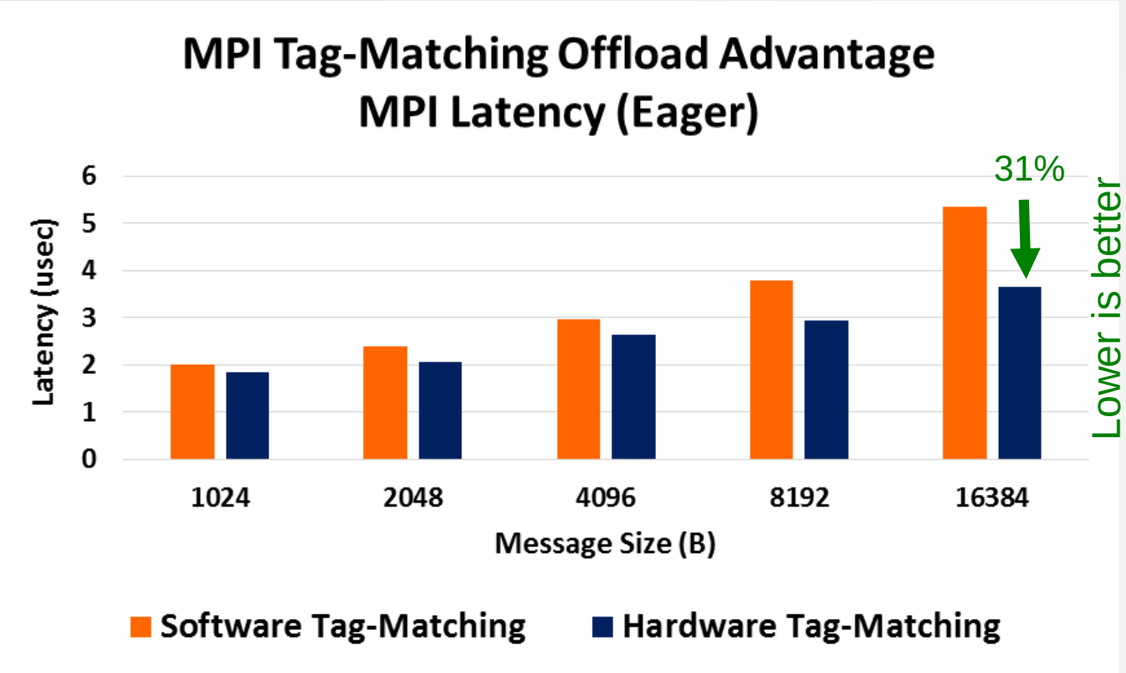


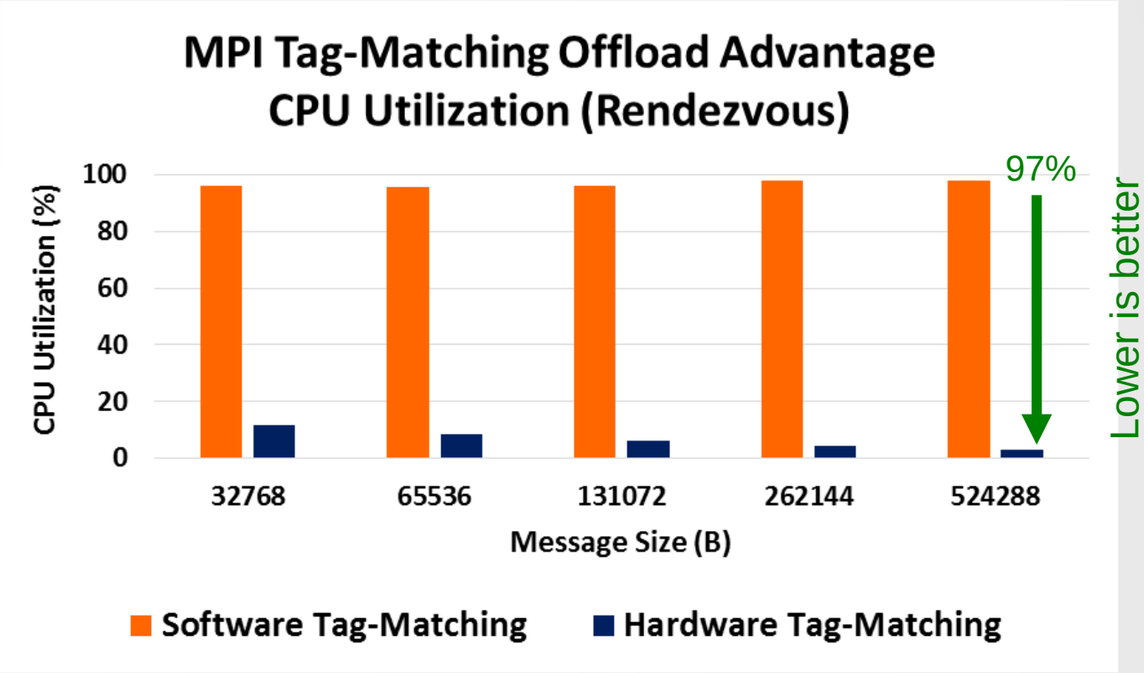






MPI Tag-Matching Offload Advantages





- 31% lower latency and 97% lower CPU utilization for MPI operations
- Performance comparisons based on ConnectX-5

Mellanox In-Network Computing Technology Deliver Highest Performance

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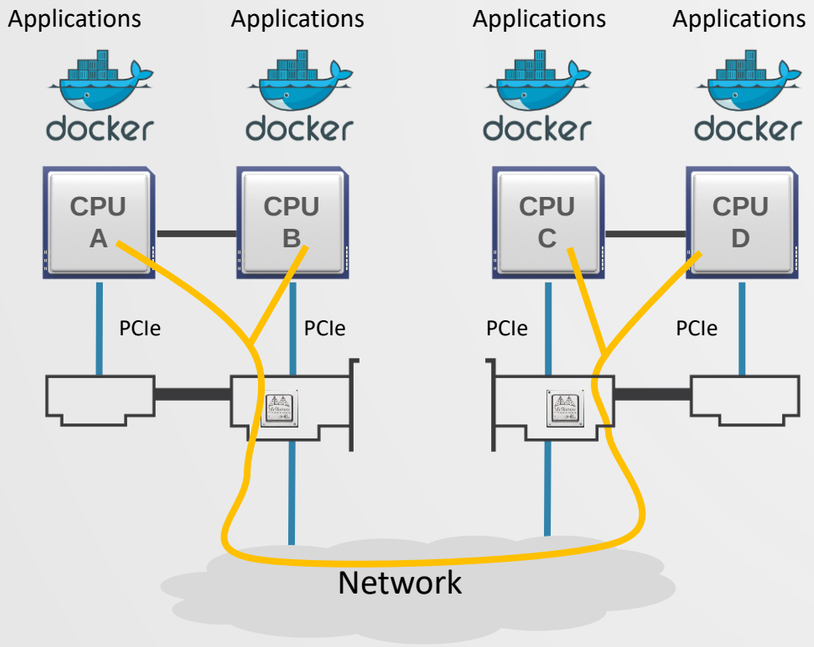
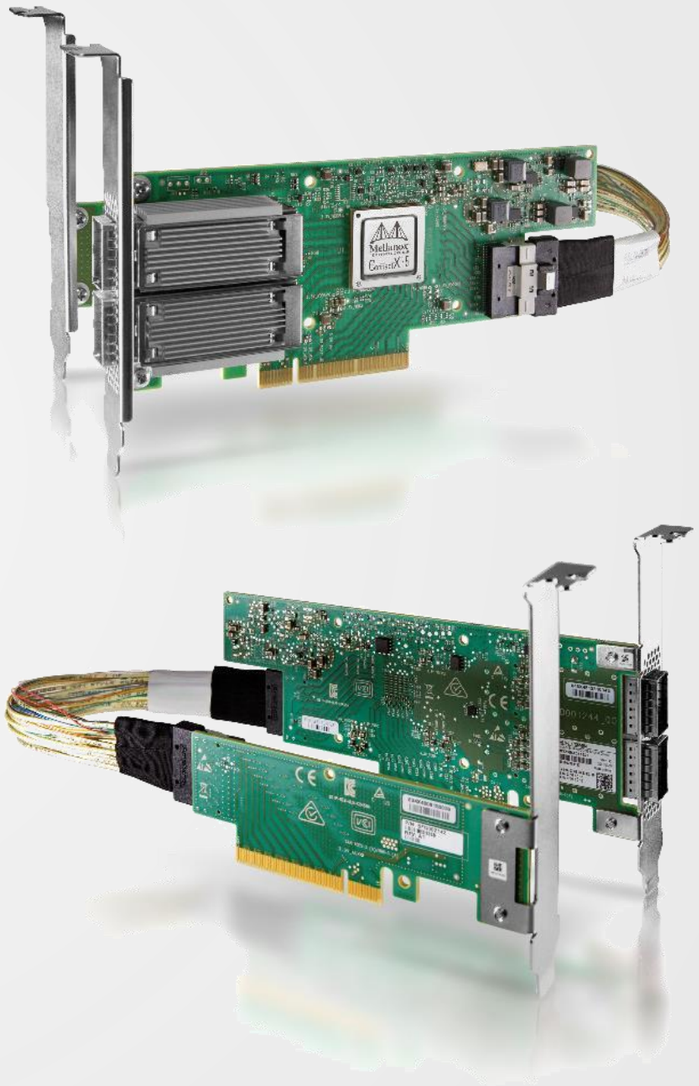
Socket Direct - Maximizing Servers Performance

- Improving ROI
  - Higher Throughput
  - Lower Latency
  - Lower CPU Utilization
- Few Flavors (different harness length)
- Enable 100Gb/s on all Servers

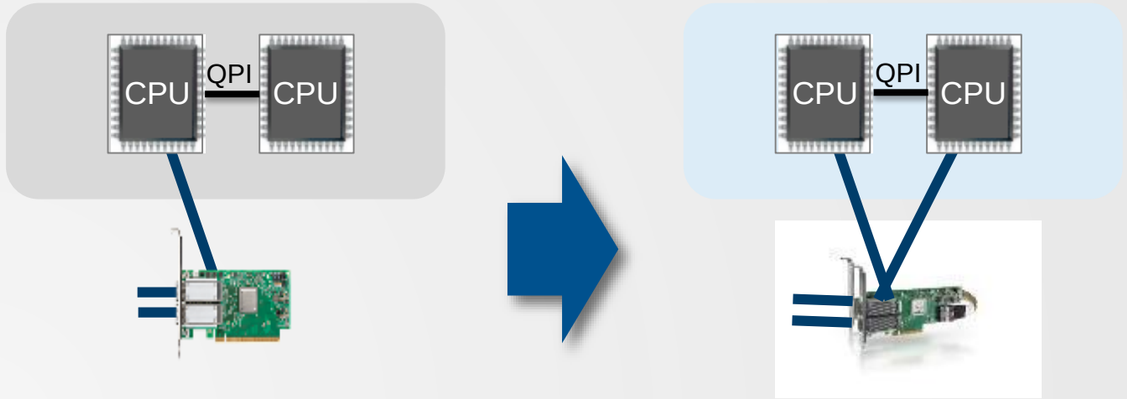
Share our White Paper and Video



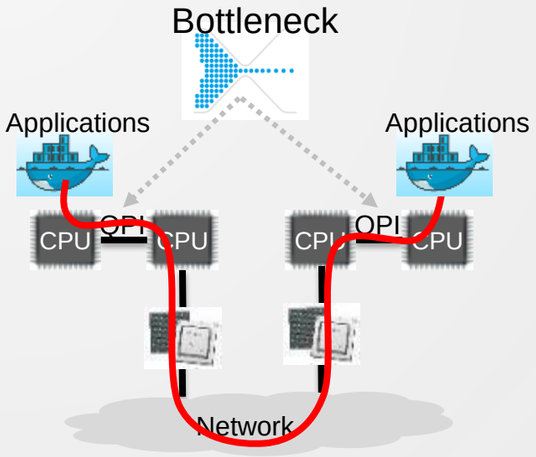


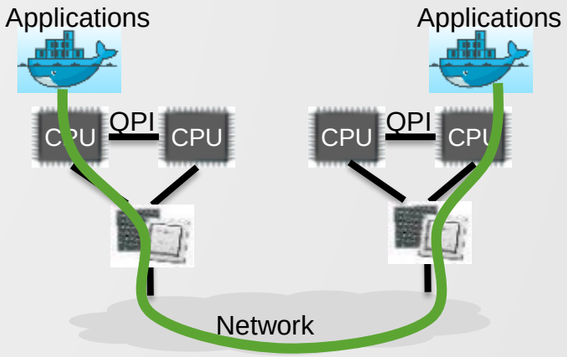
Socket Direct Adapter - Technology

- Split 100Gb/s Adapters between 2 PCI slots
  - Use two PCI x8 slots
  - Adapter and PCI extender connected by harness



- Both CPU's Directly Connected to Network
  - Increases QPI bandwidth for applications
  - Enables GPU / peer direct on both slots
  - Improved bandwidth, latency and CPU utilization

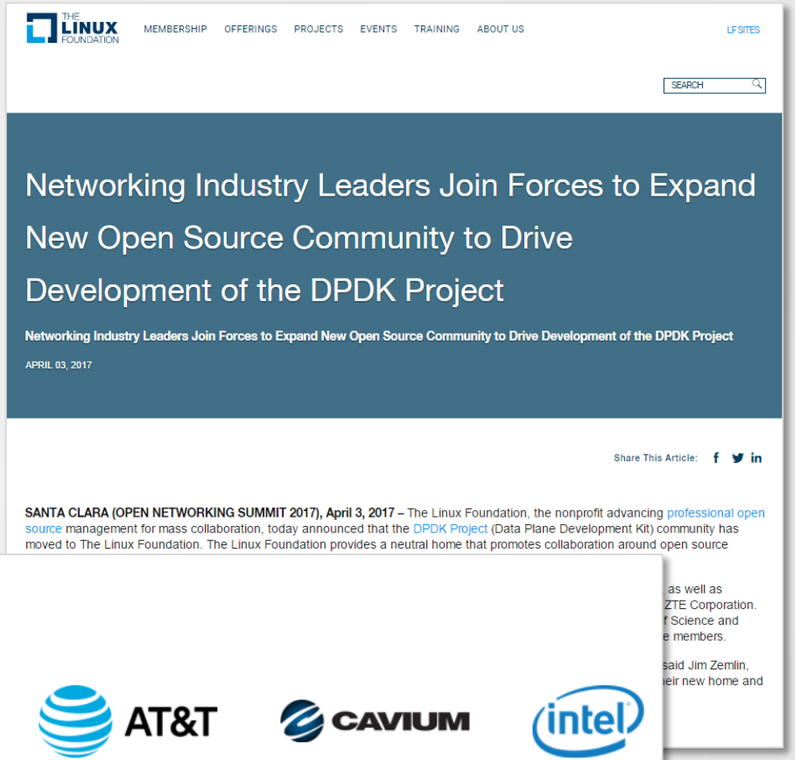




Mellanox - Gold Member and Head Maintainer of DPDK project

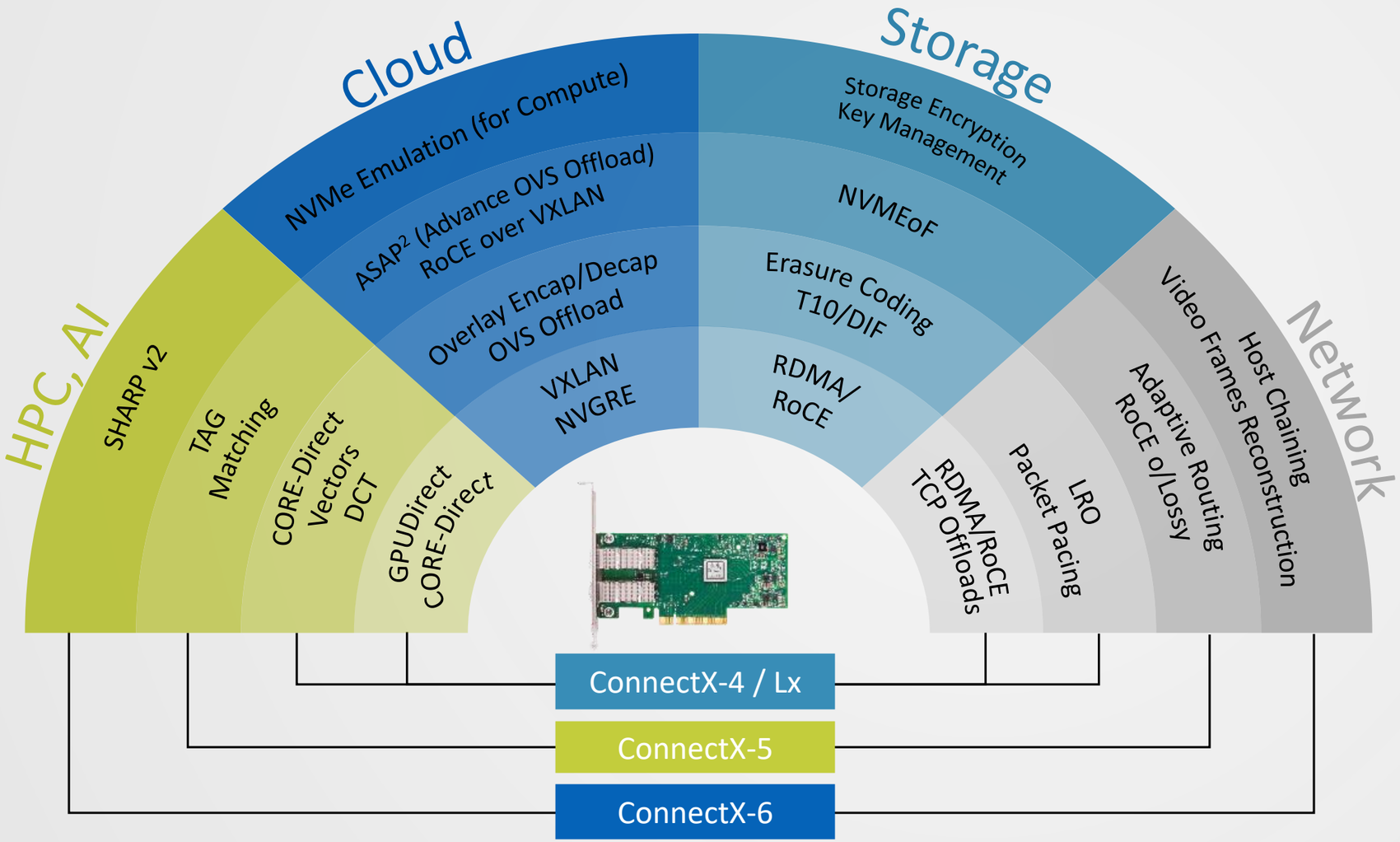
* As announced April 3rd 2017 - link

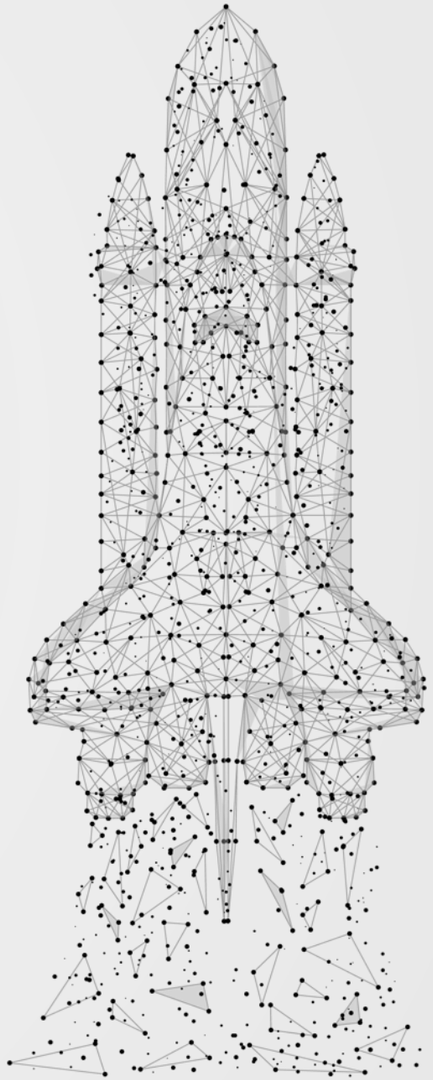
- DPDK.org project has moved to the Linux Foundation
- Mellanox joins as **Gold** member with a seat in the Governing Board
- Mellanox is the Head Maintainer of dpdk project
  - Thomas Monjalon, Head Maintainer and DPDK Technical Board member is part of Mellanox
  - Two members in Technical Board Committee
- Mellanox assigned a full time engineer to work on DPDK CI and server administration
- The number of developers and patches contributed to DPDK.org by Mellanox is continuously growing



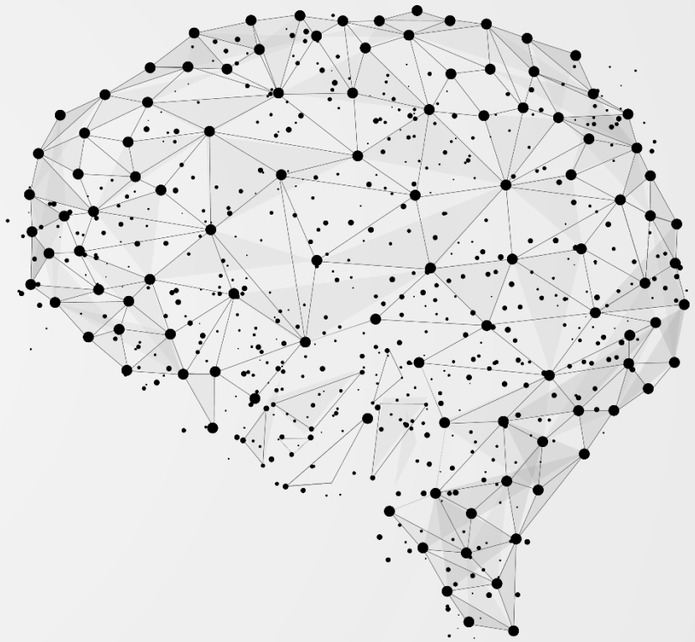
DPDK DATA PLANE DEVELOPMENT KIT → LINUX FOUNDATION

Mellanox Adapters Unique Network Intelligence





SmartNIC solution



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Innova Smart and Flexible Adapters

Innova flex

Innova SEC

Programmable

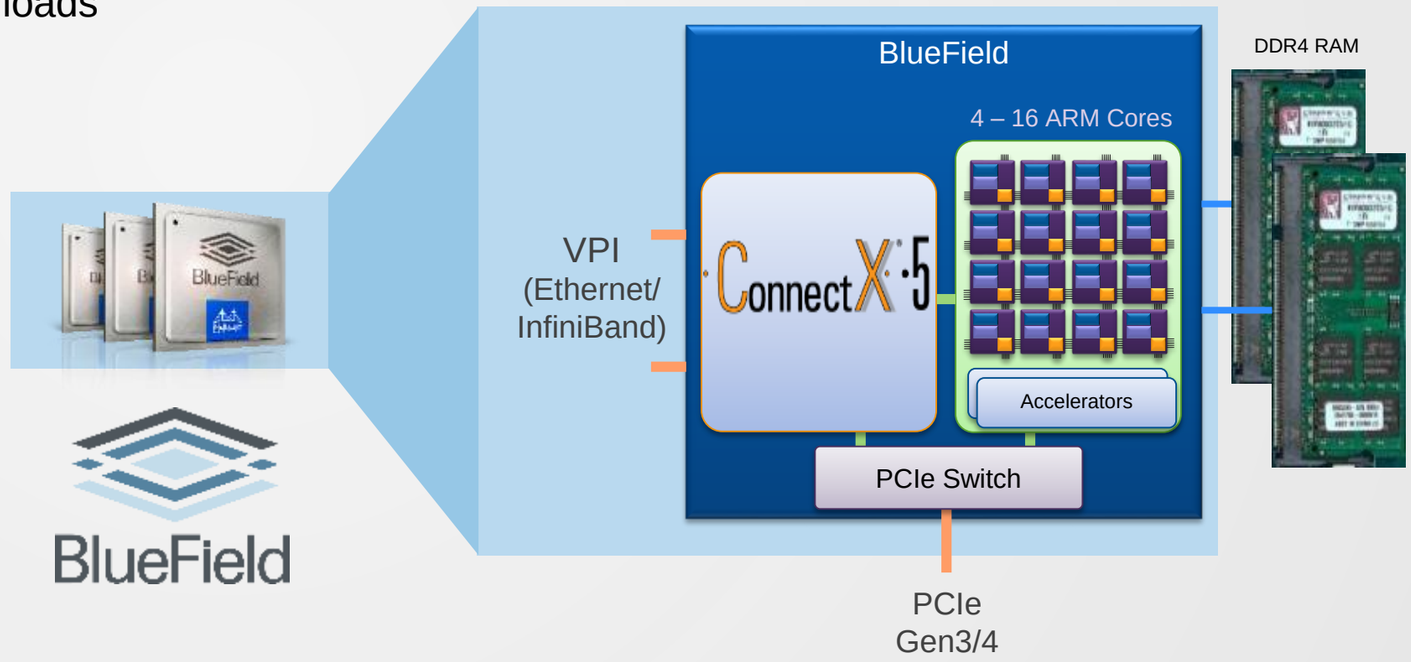
Crypto Offloads

A Configurable Adapter to Fit Your Needs

BlueField – Multi-Core System on a Chip (SoC)

BlueField: SoC Optimized for Storage and Networking

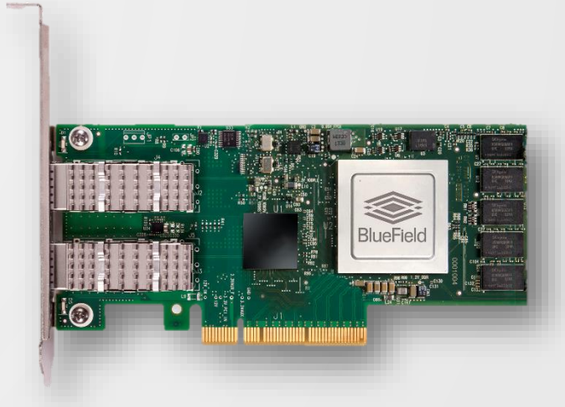
- Scale Up Storage Appliance
  - Leverage PCIe switch and NVMe over Fabric Offloads
- Security Appliance and Smart NIC
  - OVS Offload
  - Crypto Logic
- Family of Products, Variety of Options
  - 2/4/8/16 cores of A72 ARM
  - ConnectX-5 high-speed networking
  - Different number of network ports, speeds
  - 2 DDR4 channels



BlueField Intelligent Adapter

- Implementation of various types of security functions
  - Stateful L4-based firewall
  - Isolation - “compute in-front of the computer”
  - Encryption of data in motion
- Ethernet protocols accelerations
  - ASAP^2 OVS Offload - including custom implementation and extensions
  - ConnectX-5 Ethernet Offloads
  - RDMA over Converged Ethernet (RoCE)

Network Appliance



Moving Features from Cloud/Switch into the Smart NIC

Thank You

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